NORTH DAKOTA
RETIREMENT AND
INVESTMENT OFFICE
Teachers' Fund for Retirement
State Investment Board

NORTH DAKOTA TEACHERS' FUND FOR RETIREMENT

Actuarial Valuation as of July 1, 2011

Discussion of Valuation Results and Projections

October 27, 2011

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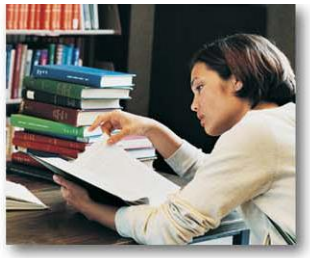

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Discussion Topics

- Overview of Valuation Process
- Summary of Valuation Highlights
- Membership and Demographics
- Valuation Results and Projections

Purposes of the Actuarial Valuation

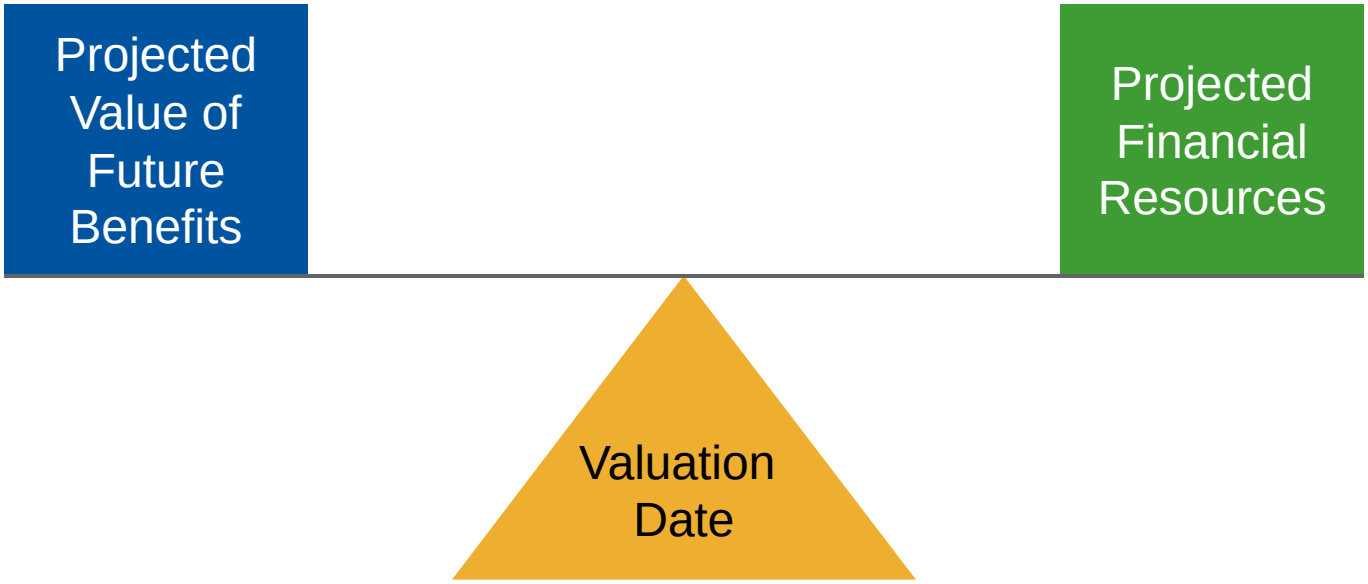
- Report the Fund's assets
- Estimate the Fund's liabilities
- Determine the Annual Required Contribution for fiscal year 2012
- Provide information for annual financial statements
- Identify emerging trends

How is an Actuarial Valuation Performed?

The actuaries will:

- Gather data as of the valuation date
  - Participant data
  - Financial data
- Project a benefit for each member, for each possible benefit
- Apply assumptions about:
  - Economic (investment return, inflation, salary raises)
  - People or demographic (death, disability, retirement, turnover)
- Apply assumptions to benefits to determine a total liability and assign liabilities to service
- Apply the funding policy to determine Annual Required Contribution
  - Based on actuarial cost method and asset valuation method

Actuarial Balance



Over the life of a pension system,

Benefits + Expenses = Contributions + Investment Return

Contributions = Benefits + Expenses - Investment Return

Actuarial Assumptions

Two types:

Demographic	Economic
• Retirement • Disability • Death in active service • Withdrawal • Death after retirement	• Inflation • Interest rate (return on assets) • Salary increases • Payroll growth

Actuaries make assumptions as to when and why a member will leave active service, and estimate the amount and duration of the pension benefits paid.

Economic Assumptions

Interest Rate

- 8%

Salary Increase Rates

- Based on service
- Ranges from 14.75% for new members to 4.5% for members with 25 or more years of service

Payroll Growth

- 3.25%

Actuarial Methods

Asset valuation method (actuarial value of assets)

- Smoothing of investment gains or losses
- TFFR uses a five-year smoothing method
  - Investment returns above or below the expected return are recognized over five years
- No market value corridor is applied (e.g., actuarial value must fall within 80% to 120% of market value)

Cost method

- Allocation of liability between past service and future service
  - TFFR uses the entry age normal cost method
  - Most retirement systems use the entry age normal cost method

Amortization method

- 30-year “open” period to pay off unfunded actuarial accrued liability
- Based on level percentage of payroll
- Governmental Accounting Standards Board requires 30-year maximum period to determine the Annual Required Contribution

Entry Age Normal Cost Method

Allocates Cost Between Past and Future service

- **Normal Cost:** Cost of annual benefit accrual as a level percent of salary
- **Actuarial Accrued Liability:** Represents accumulated value of past normal costs (or difference between total cost and future normal costs)
- **Unfunded Actuarial Accrued Liability:** Actuarial accrued liability minus actuarial value of assets
- **Annual Required Contribution:**
  - Normal cost plus
  - Amortization payment of unfunded accrued liability over a 30-year period as a percent of payroll

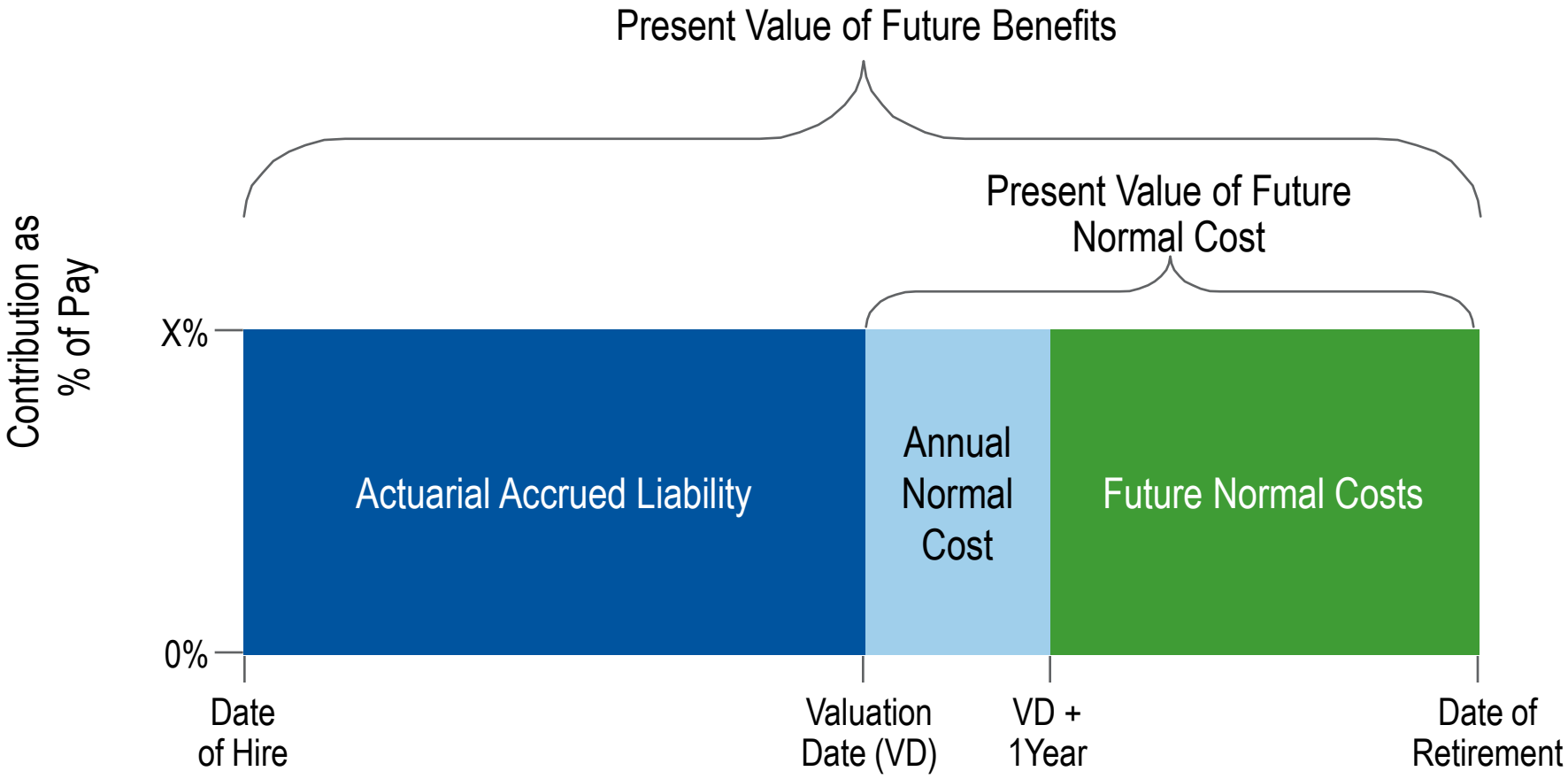
Actuarial Accrued Liability and Normal Cost

The **actuarial accrued liability** is the portion of the total liability that is allocated to members' past years of service

- **Retirees and beneficiaries:**
  - All years of service are in the past, so the **actuarial accrued liability** is equal to the total liability
- **Active members:**
  - The **actuarial accrued liability** represents the portion of the total liability that is attributable to the years of service that the members have already worked
  - The **normal cost** represents the anticipated growth in the accrued liability in the coming year

The actuarial accrued liability is compared to the assets as a measure of funding progress.

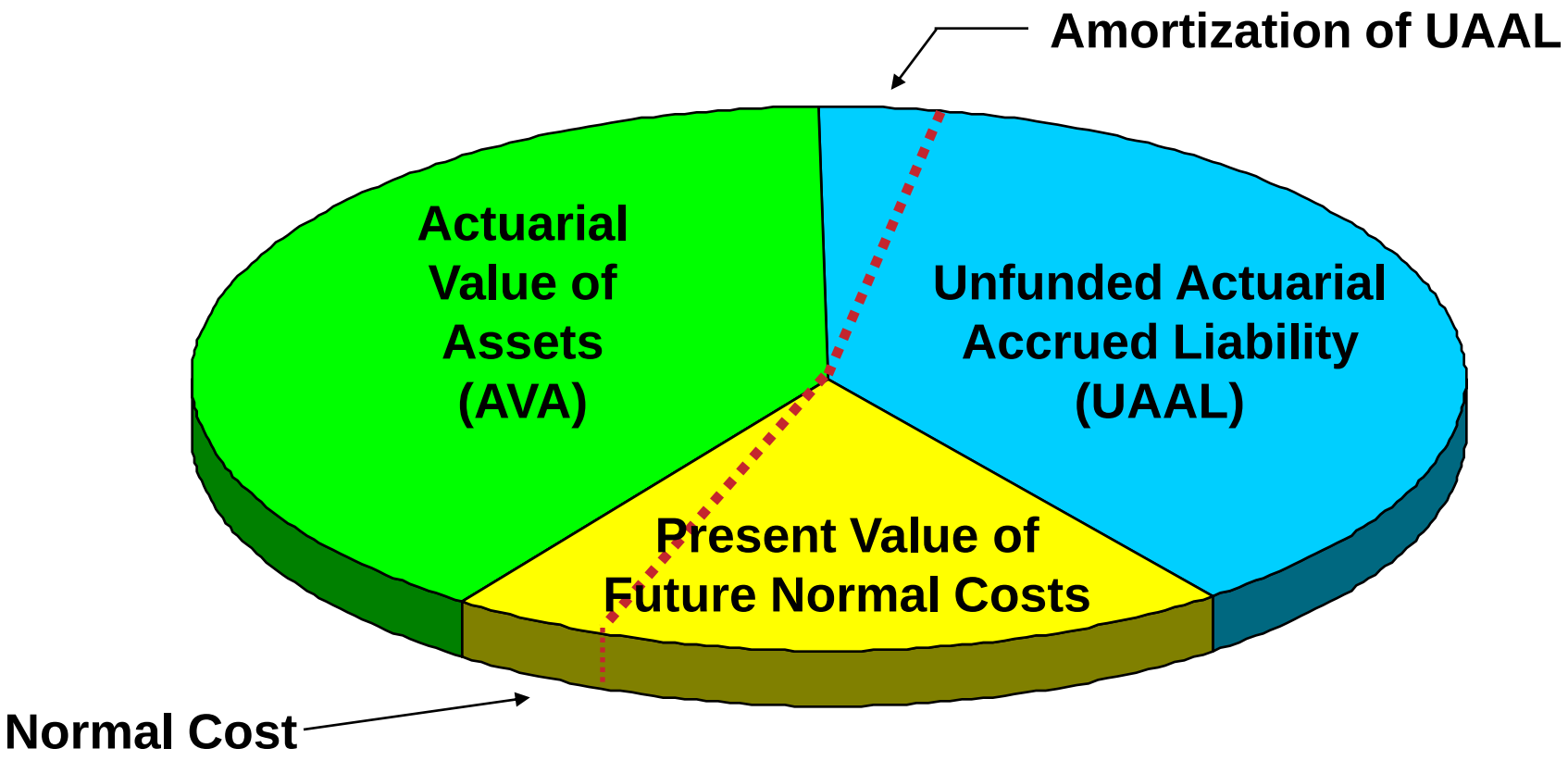
Funding Process



Actuarial Accrued Liability - Assets = Unfunded Actuarial Accrued Liability

Annual Required Contribution

Present Value of Future Benefits



Summary of Valuation Highlights

- Valuation reflects plan changes in House Bill 1134 (HB 1134)
  - Certain current Tier 1 members are considered Grandfathered Tier 1
    - If as of June 30, 2013:
      - Member is vested (at least 3 years of service) and at least age 55, OR
      - The sum of the member's age and service is at least 65
    - Normal retirement eligibility is Rule of 85
  - All other current Tier 1 members are considered Non-grandfathered Tier 1
    - Normal retirement eligibility for Non-grandfathered Tier 1 and all Tier 2 members is Rule of 90 with a minimum age of 60
      - Eligibility for Non-grandfathered Tier 1 members was Rule of 85 with no minimum age
      - Eligibility for Tier 2 members was Rule of 90 with no minimum age
    - Early retirement benefit reduced by 8% from normal retirement eligibility
  - Disability retirement eligibility after 5 years of service (instead of 1 year)
    - Benefit is based on actual service instead of 20 year minimum
  - Re-employed retirees are required to pay member contributions

Summary of Valuation Highlights *continued*

- HB 1134 increases contribution rates by 4% for both members and employers over the next 2 biennia
  - Member rate increases from 7.75% in FY12 to 9.75% for FY13 and FY14 and to 11.75% for FY15 and thereafter
  - Employer rate increases from 8.75% in FY12 to 10.75% for FY13 and FY14 and to 12.75% for FY15 and thereafter
  - Increases would revert to 7.75% for both members and employers once the funded ratio reaches 90% (measured using the actuarial value of assets)
- Market value of assets returned 23.5% for year ending 6/30/11 (Segal calculation)
  - Gradual recognition of deferred losses resulted in 1.4% return on actuarial assets
  - Unrecognized investment losses represent about 6% of market assets
- Net impact on funded ratio was a decrease from 69.8% (as of 7/1/2010) to 66.3% (as of 7/1/2011)
  - Recognition of HB 1134 alone (benefit/eligibility changes) resulted in an increase of 0.6%

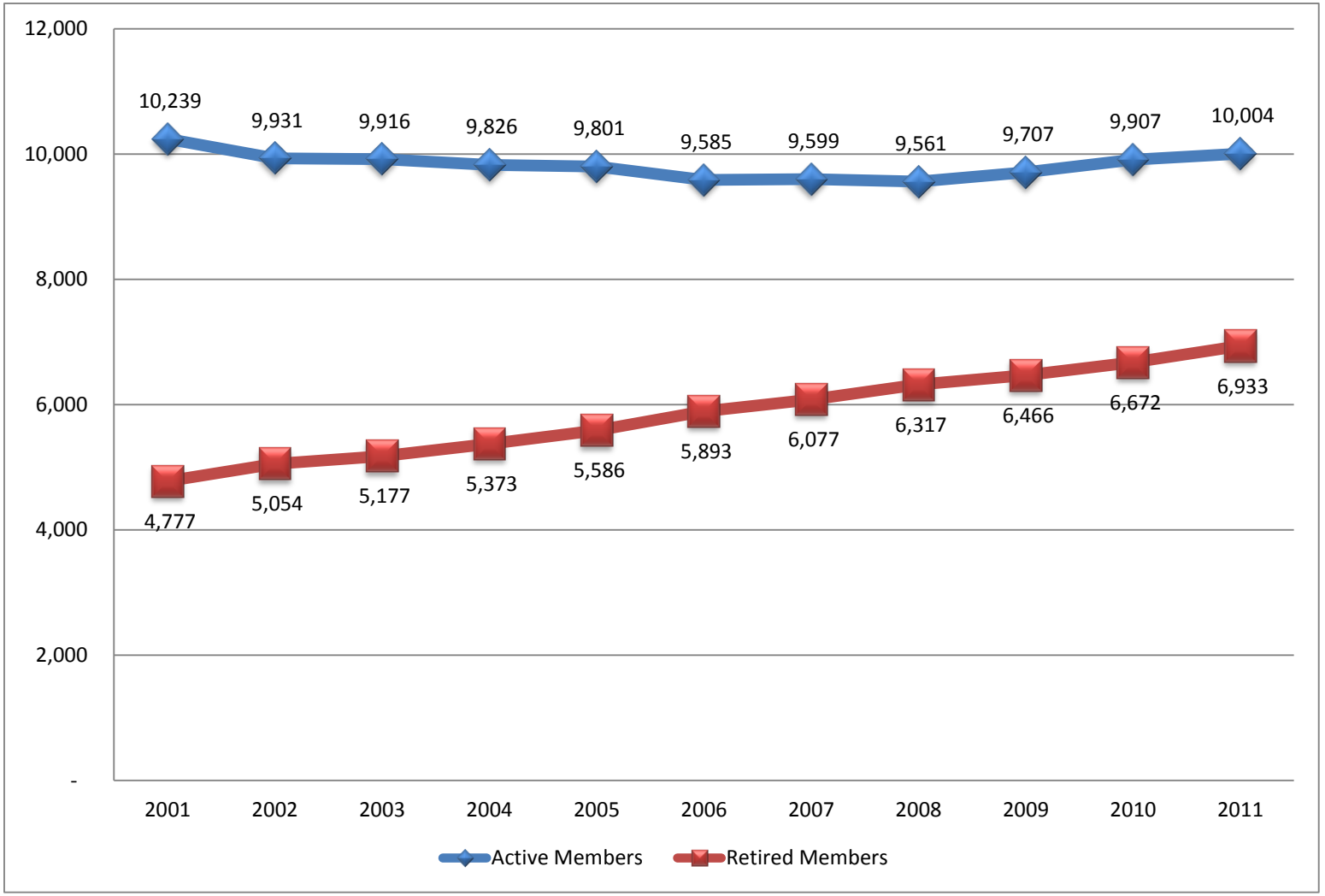
Summary of Valuation Highlights *continued*

- Net impact on GASB 25 Annual Required Contribution (ARC) was an increase from 12.79% of payroll (FY11) to 13.16% of payroll (FY12)
  - Based on the employer contribution rate for fiscal 2012 of 8.75%, there is a contribution deficiency of 4.41% of payroll
    - Contribution rate increases from HB 1134 will address this deficiency

Membership

	2011	2010	Change
Active:			
• Number	10,004	9,907	+0.9%
• Payroll	$488.8 mil	$465.0 mil	5.1%
• Average Age	43.9 years	44.2 years	- 0.3 years
• Average Service	13.8 years	14.0 years	- 0.2 years
Retirees and Beneficiaries			
• Number	6,933	6,672	+3.9%
• Total Annual Benefits	$ 133.6 mil	$ 125.2 mil	+6.7%
• Average Monthly Benefit	$1,606	$1,564	+2.7%

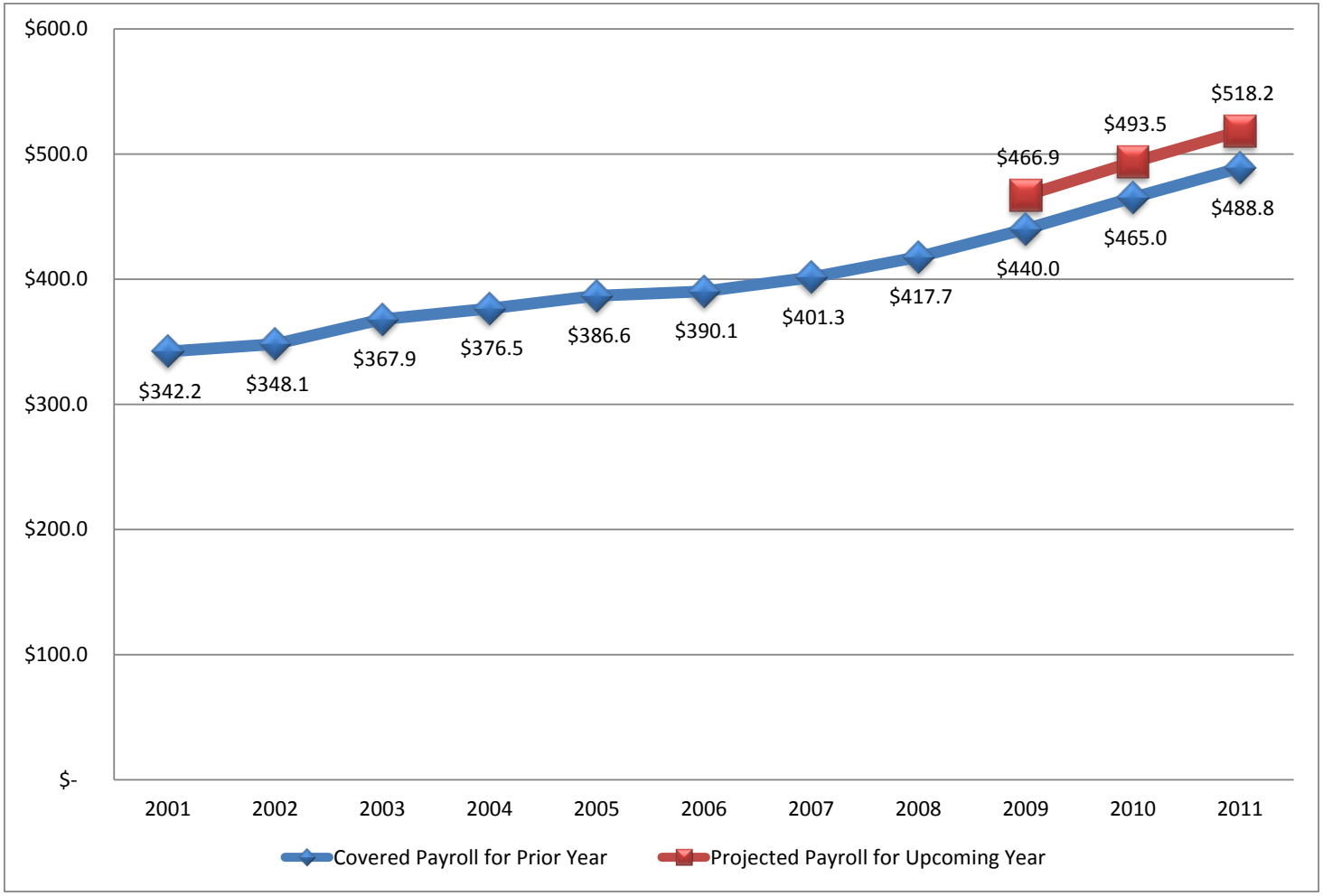
Active and Retired Membership



Since 2001, number of retirees and beneficiaries has increased 3.8% per year on average.

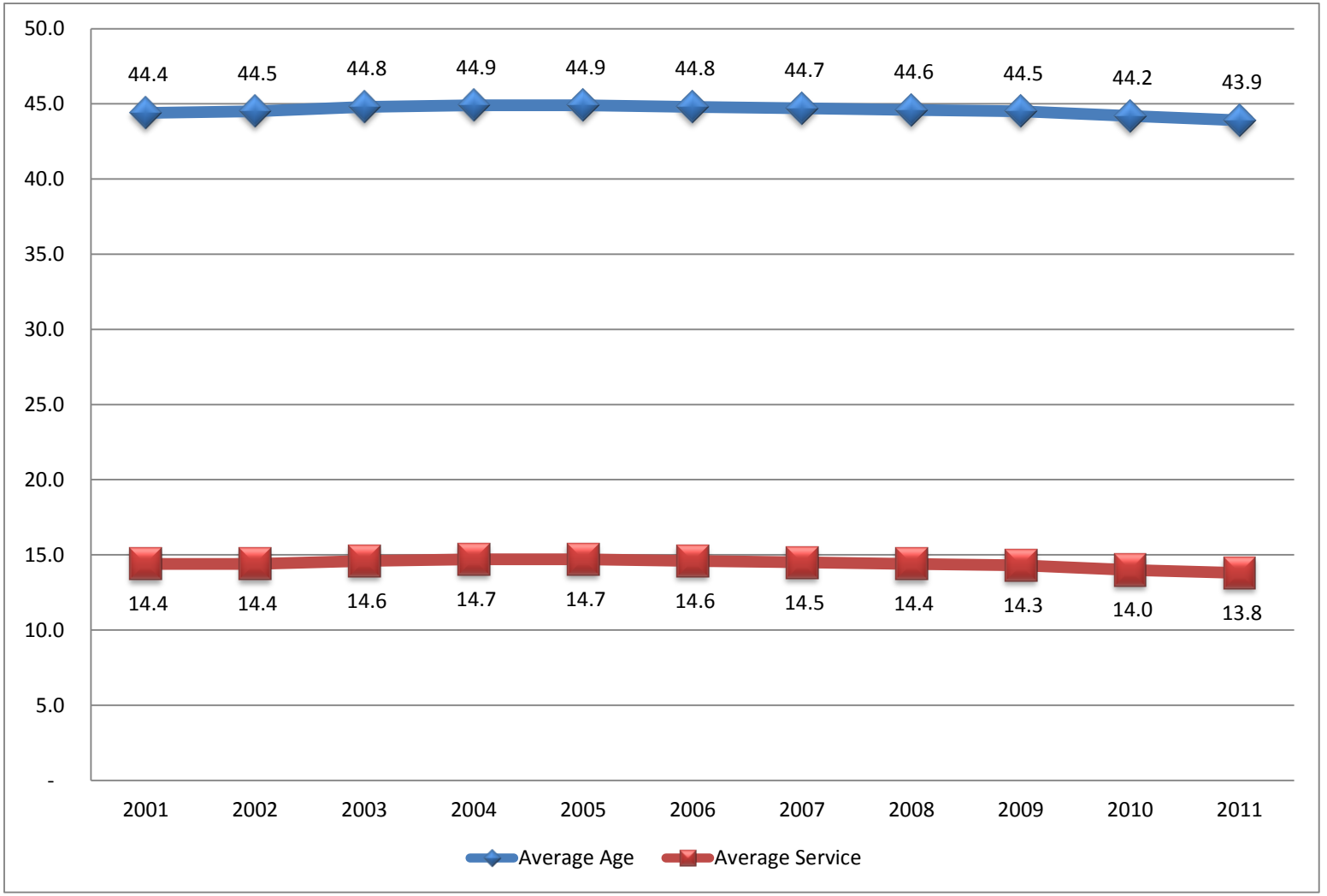
Active Payroll

$ Millions

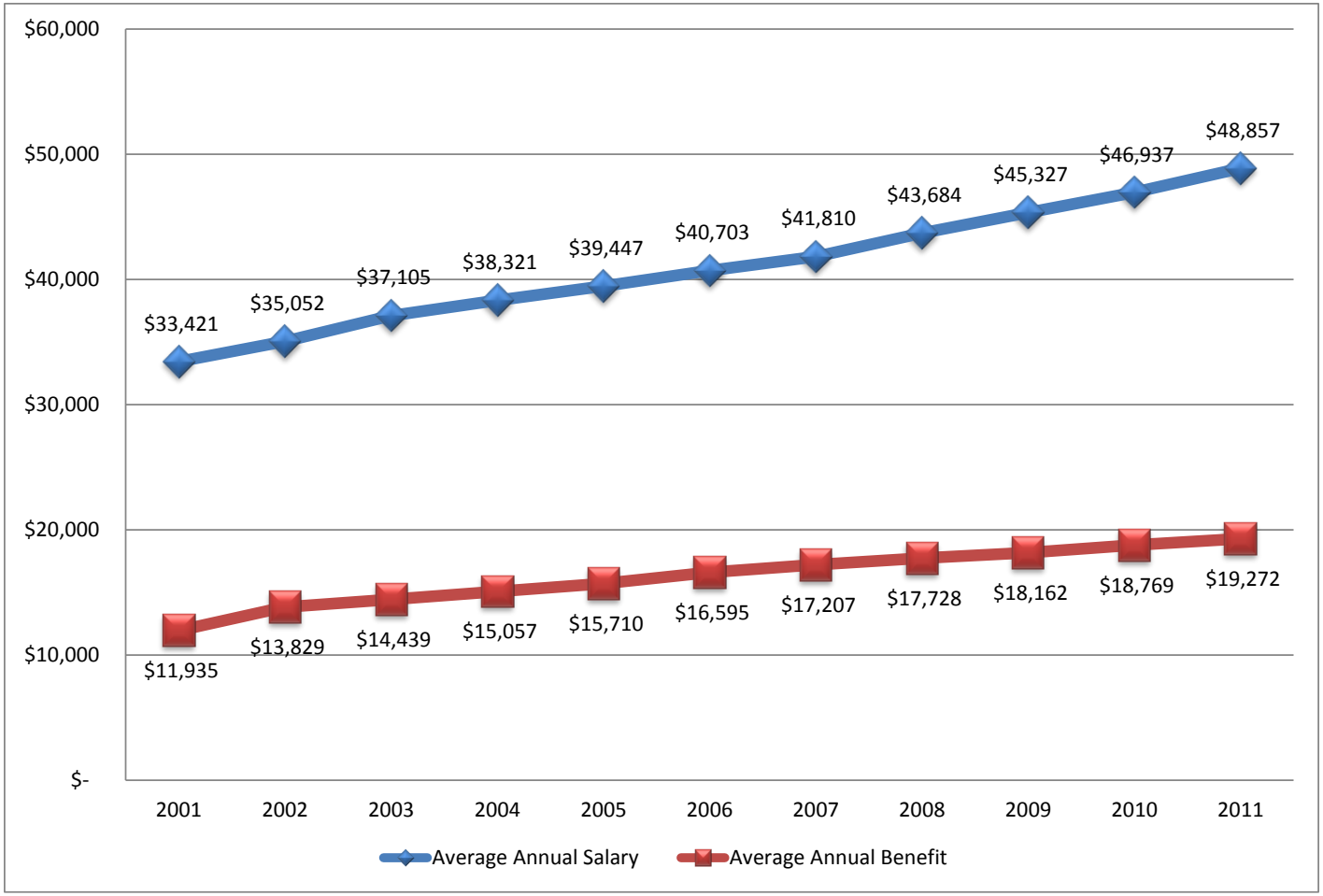


Since 2001, active payroll has increased, on average, 3.6% per year.

Average Age and Service of Active Members



Average Salary and Average Benefit



Since 2001, average salary has increased, on average, 3.9% per year. Average annual benefit has increased by 4.9% per year.

Assets

- The market value of assets increased from $1.438 billion (as of June 30, 2010) to $1.726 billion (as of June 30, 2011)
  - Segal determined the investment return was 23.5%, net of investment and administrative expenses
- The actuarial value of assets – which smoothes investment gains and losses over five years – decreased from $1.842 billion (as of June 30, 2010) to $1.823 billion (as of June 30, 2011)
  - Investment return of 1.4%, net of investment and administrative expenses
  - Actuarial value is 105.6% of market
  - There is a total of $96 million of deferred investment losses that will be recognized in future years
- The average annual return on market assets over the past 10 years is 5.1%
  - 20-year average is 7.7%
- The average annual return on actuarial assets over the past 10 years is 4.5%
  - 20-year average is 7.3%

Market Value of Assets ($ in millions)

Fiscal Year Ending June 30, 2011	
Beginning of Year	$1,438
Contributions:	
• Employer	45
• Member	39
• Service Purchases	1
• Total	85
Benefits and Refunds	(130)
Investment Income (net)	333
End of Year	$1,726
Rate of Return	23.5%

Actuarial Value of Assets ($ in millions)

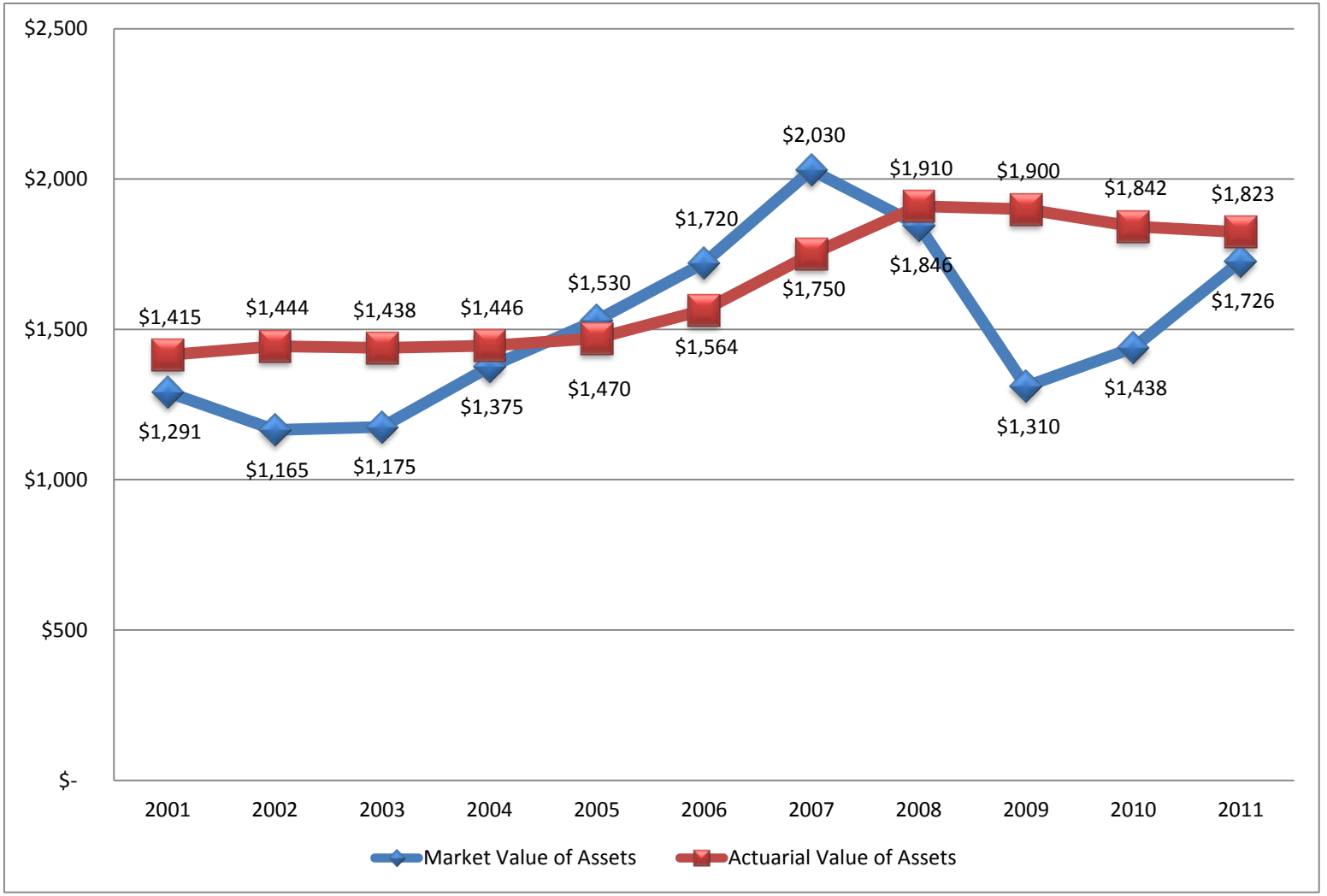
1. Market Value of Assets as of June 30, 2010	$1,438
2. Contributions and Benefits for FYE June 30, 2011	(45)
3. Expected Return	113
4. Expected Market Value of Assets (1) + (2) + (3)	$1,506
5. Actual Market Value of Assets on June 30, 2011	**1,726**
6. Excess/(Shortfall) for FYE June 30, 2011 (5) – (4)	220
Excess/(Shortfall) Returns:	

Year	Initial Amount	Deferral %	Unrecognized Amount
2011	$220	80%	$176
2010	74	60%	45
2009	(640)	40%	(256)
2008	(303)	20%	(61)
2007	210	0%	0
7. Total			**($96)**

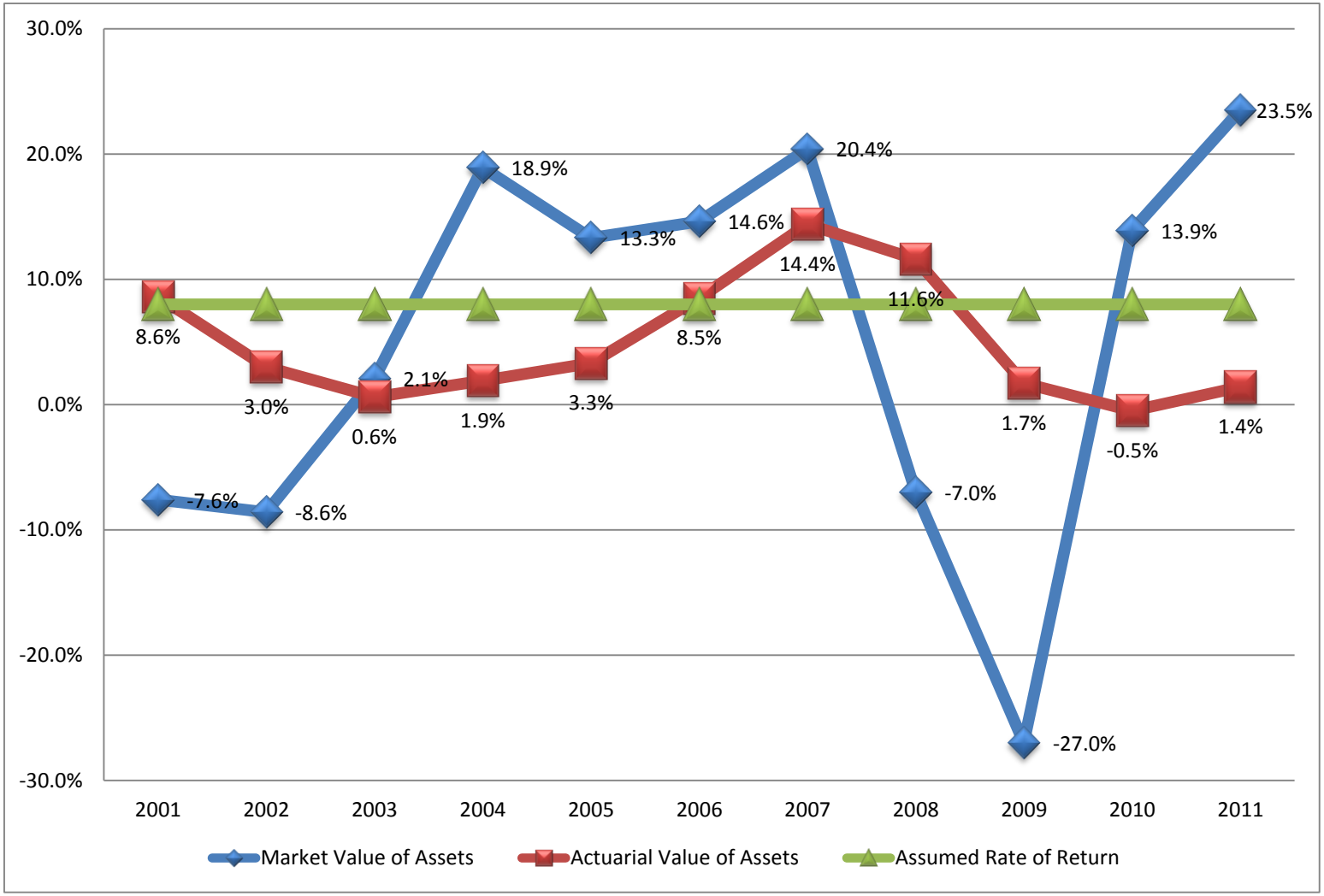
8. Actuarial Value of Assets as of June 30, 2011 (5) - (7)	**$1,823**
9. Actuarial Value of Assets as a % of Market Value of Assets	106%

Market and Actuarial Values of Assets

$ Millions

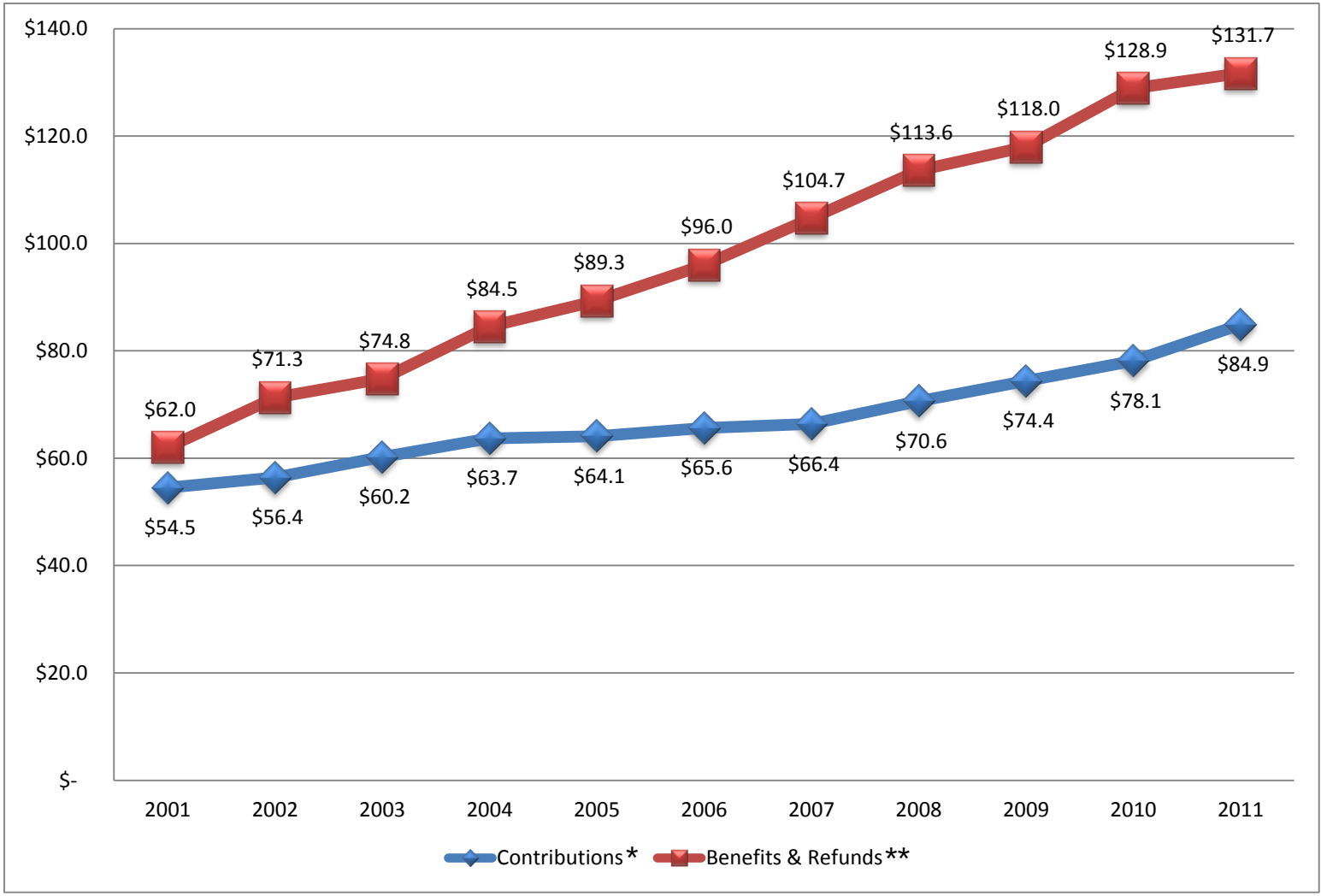


Asset Returns



Contributions vs. Benefits and Refunds

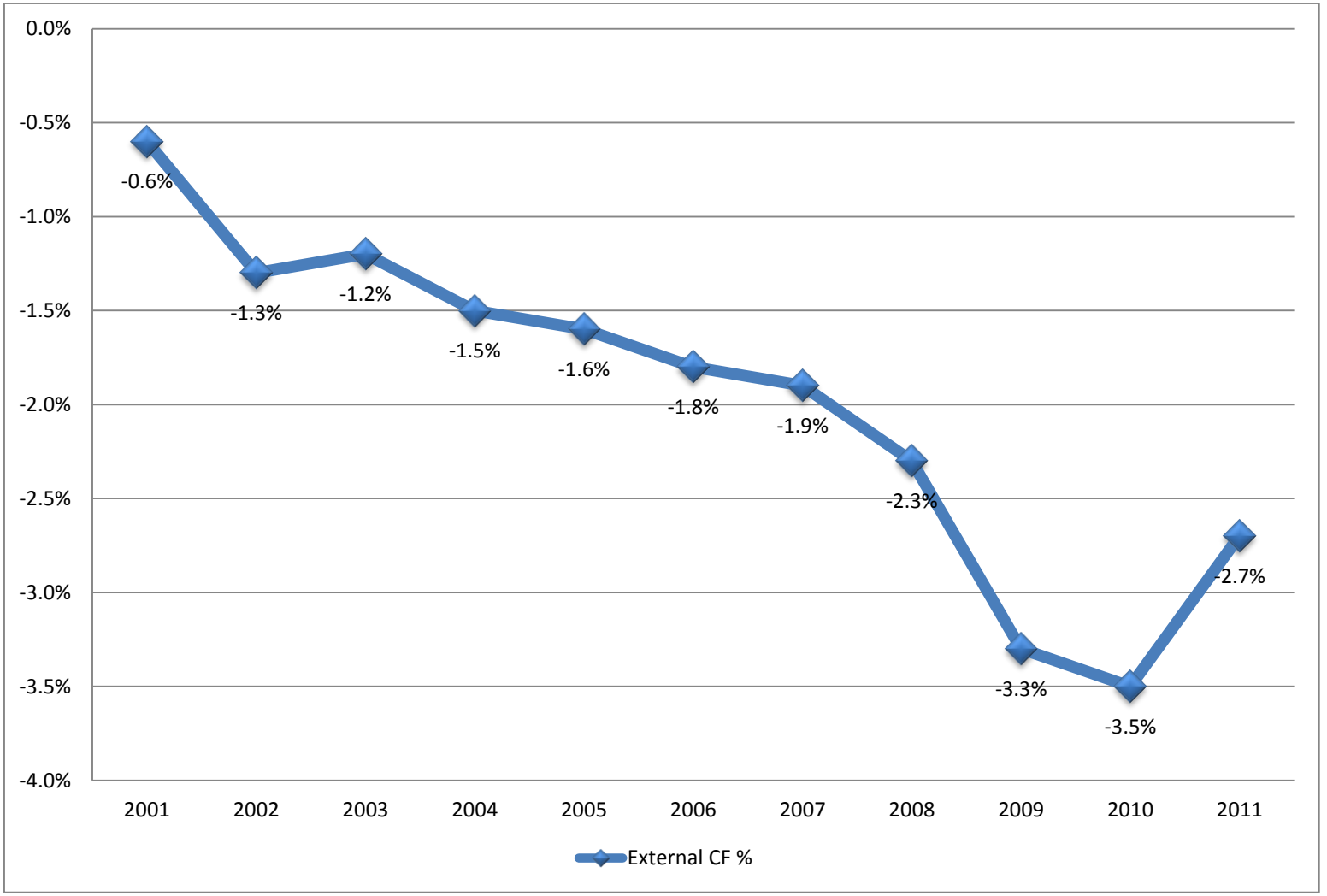
$ Millions



* Includes member and employer contributions, and service purchases

** Includes administrative expenses

External Cash Flow as a % of Market Value



Valuation Results ($ in millions)

	July 1, 2011	July 1, 2010
Actuarial Accrued Liability:		
• Active Members	$1,352	$1,328
• Inactive Members	66	63
• Retirees and Beneficiaries	1,332	1,246
Total	**$2,750**	**$2,637**
Actuarial Assets	1,823	1,842
Unfunded Accrued Liability	$ 927	$ 795
Funded Ratio	66.3%	69.8%

Annual Required Contribution

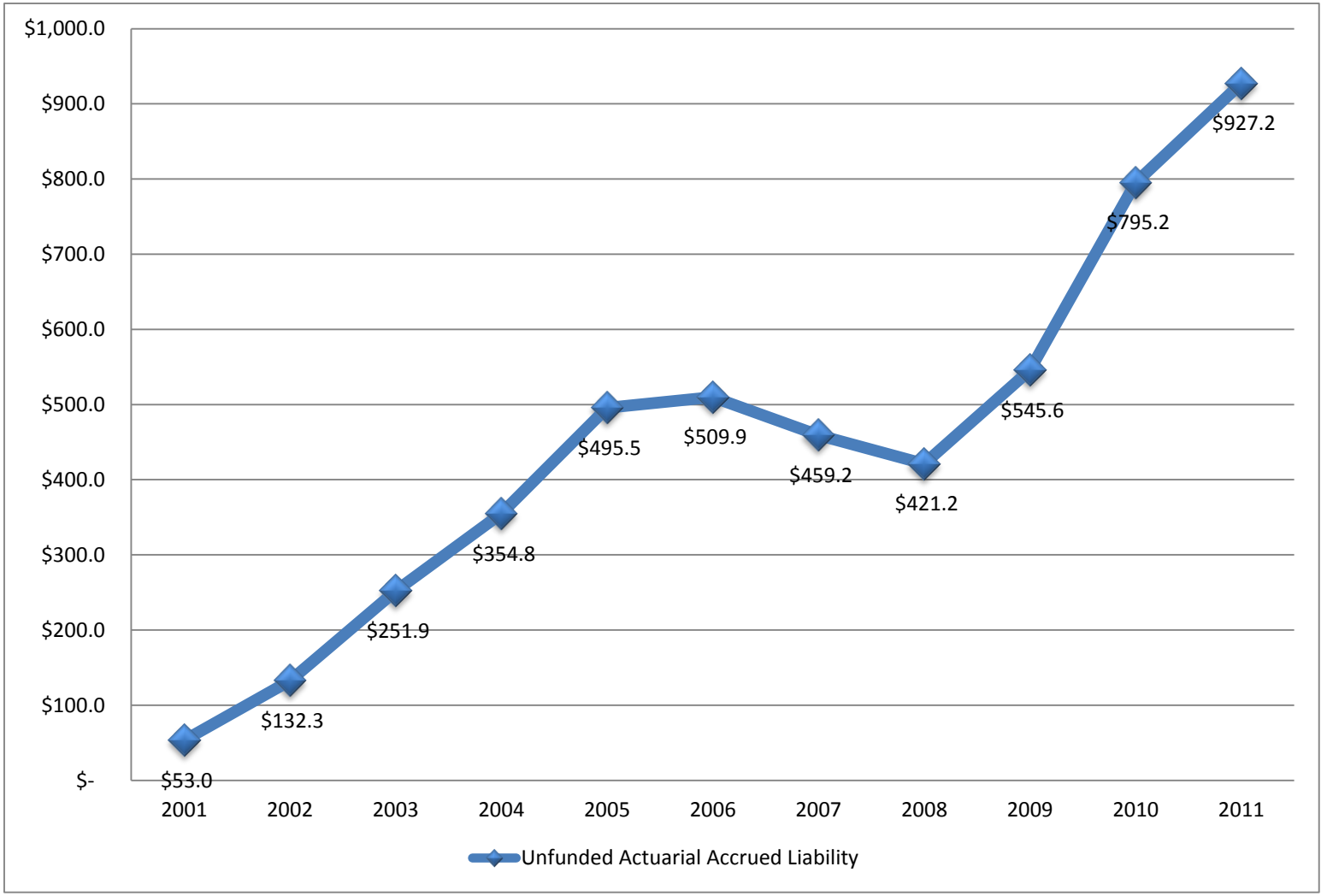
	July 1, 2011	July 1, 2010
Normal Cost Rate	9.80%	10.57%
Member Rate	7.75%	7.75%
Employer Normal Cost Rate	2.05%	2.82%
Adjusted for Timing	2.12%	2.82%
Amortization of UAAL	11.04%	9.97%
Annual Required Contribution	13.16%	12.79%
Employer Rate	8.75%	8.75%
Contribution Sufficiency/(Deficiency)	(4.41%)	(4.04%)

Valuation Results - Comments

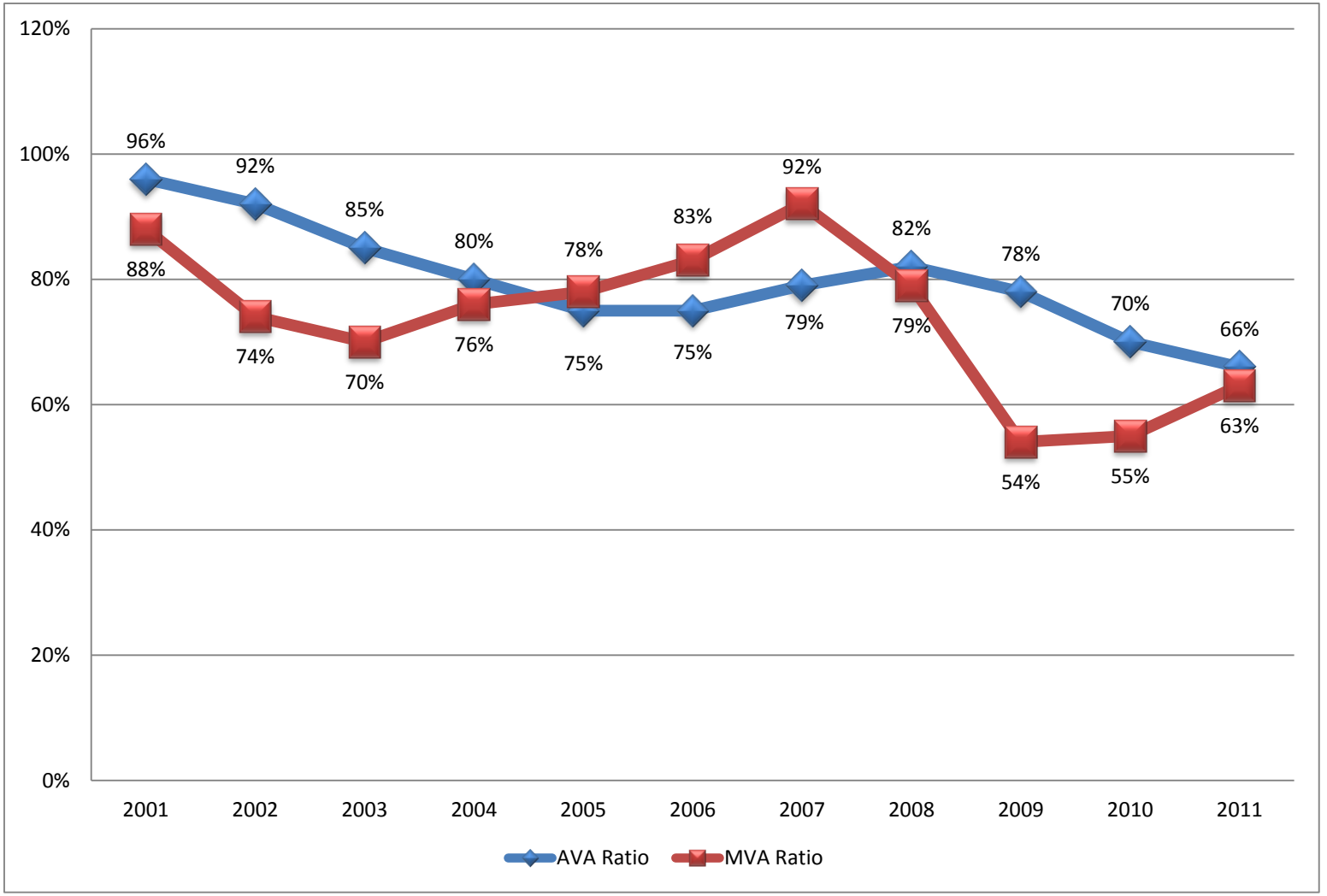
- The actuarial accrued liability increased from $2.637 billion (as of June 30, 2010) to $2.750 billion (as of June 30, 2011)
  - This includes a decrease of $24 million due to reflecting the retirement eligibility changes in HB 1134
- The unfunded actuarial accrued liability (UAAL) increased from $795 million to $927 million
  - UAAL is 190% of projected active payroll
- The funded ratio on an AVA basis decreased from 70% to 66%
  - On a market value basis, the funded ratio increased from 55% to 63%
- The Annual Required Contribution (ARC) increased from 12.79% of payroll to 13.16% of payroll
  - Compared to 8.75% employer contribution, results in a contribution shortfall of 4.41%
  - The funding period based on the 8.75% statutory rate is infinite
  - Reflecting the full 8% increase in total contribution rate would result in a funding period of 18 years

Unfunded Actuarial Accrued Liability

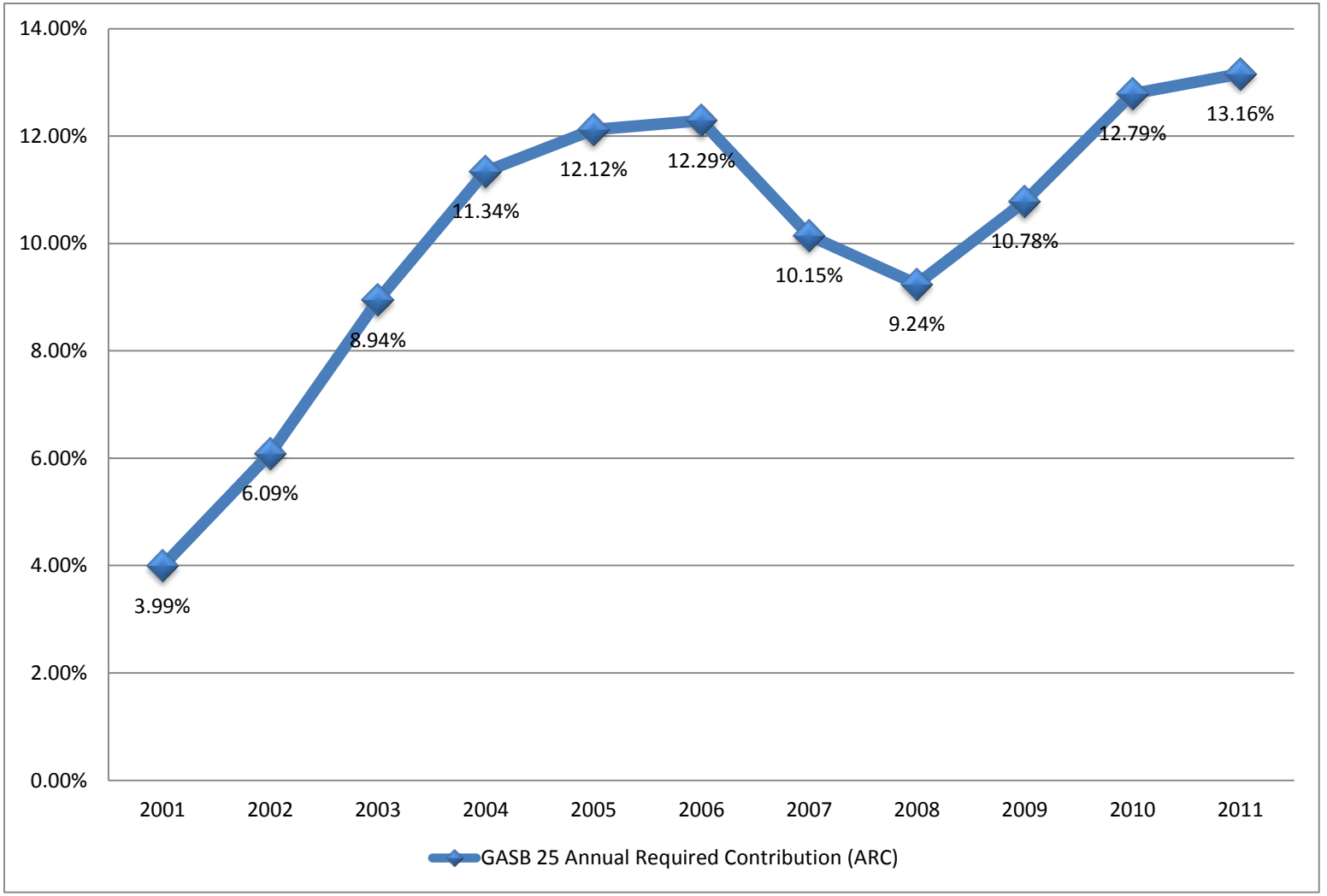
$ Millions



Funded Ratios



GASB 25 Annual Required Contribution (ARC)



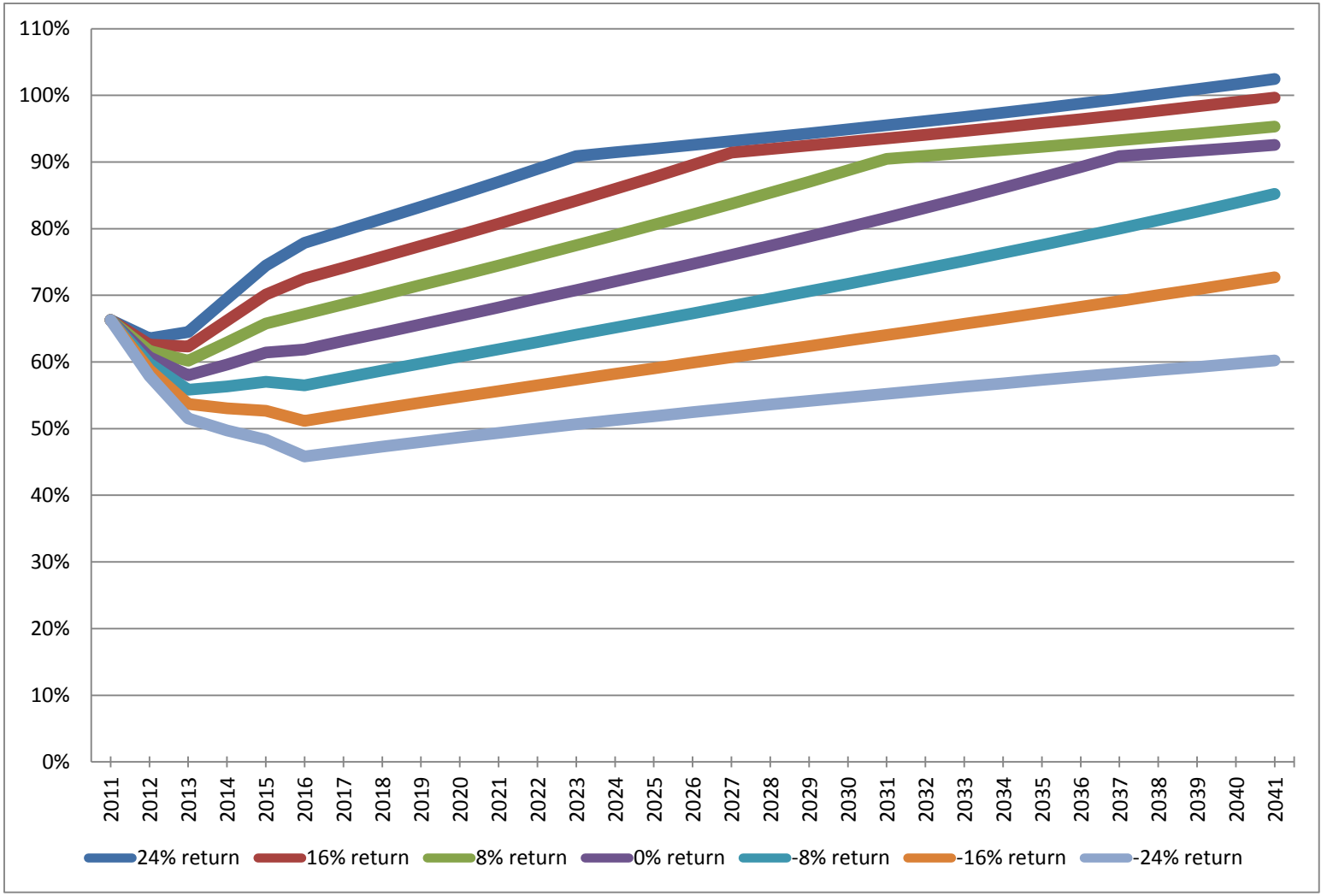
Since 2005, the calculation of the ARC is based on 30-year level percentage of payroll amortization.

Prior to 2005, the ARC calculation was based on a 20-year amortization period.

Projections

- Projections of estimated funded ratios for 30 years
  - Based on FY12 investment return scenarios ranging from -24% to +24%
  - Assumed Fund earns 8% per year in FY13 and each year thereafter
  - All other experience is assumed to emerge as expected
- Includes contribution rate increases from HB 1134
  - Member rate increases from 7.75% in FY12 to 9.75% for FY13 and FY14 and to 11.75% for FY15 and thereafter
  - Employer rate increases from 8.75% in FY12 to 10.75% for FY13 and FY14 and to 12.75% for FY15 and thereafter
  - Increases “sunset” back to 7.75% once the funded ratio reaches 90% (based on actuarial assets)

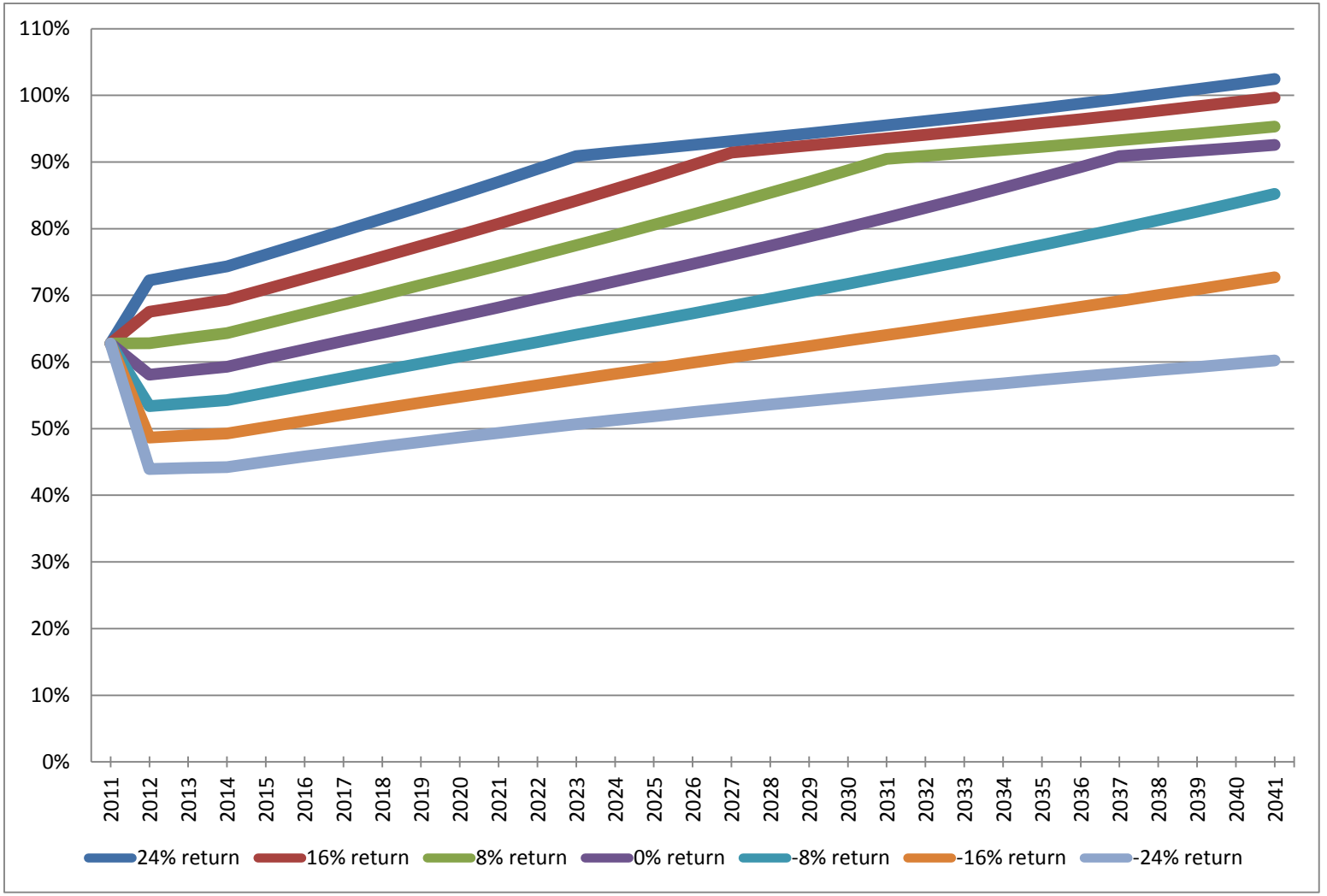
Projected Funded Ratios (AVA Basis)



Projected Funded Ratios (AVA Basis)

Valuation Year	24% for FY2012	16% for FY2012	8% for FY2012	0% for FY2012	-8% for FY2012	-16% for FY2012	-24% for FY2012
2011	66%	66%	66%	66%	66%	66%	66%
2012	64%	63%	62%	61%	60%	59%	58%
2013	64%	62%	60%	58%	56%	54%	52%
2014	70%	66%	63%	60%	56%	53%	50%
2015	74%	70%	66%	61%	57%	53%	48%
2016	78%	73%	67%	62%	57%	51%	46%
2021	87%	81%	74%	68%	62%	56%	49%
2026	93%	90%	82%	75%	67%	60%	52%
2031	95%	94%	90%	82%	73%	64%	55%
2036	99%	96%	93%	89%	79%	68%	58%
2041	102%	100%	95%	93%	85%	73%	60%

Projected Funded Ratios (MVA Basis)



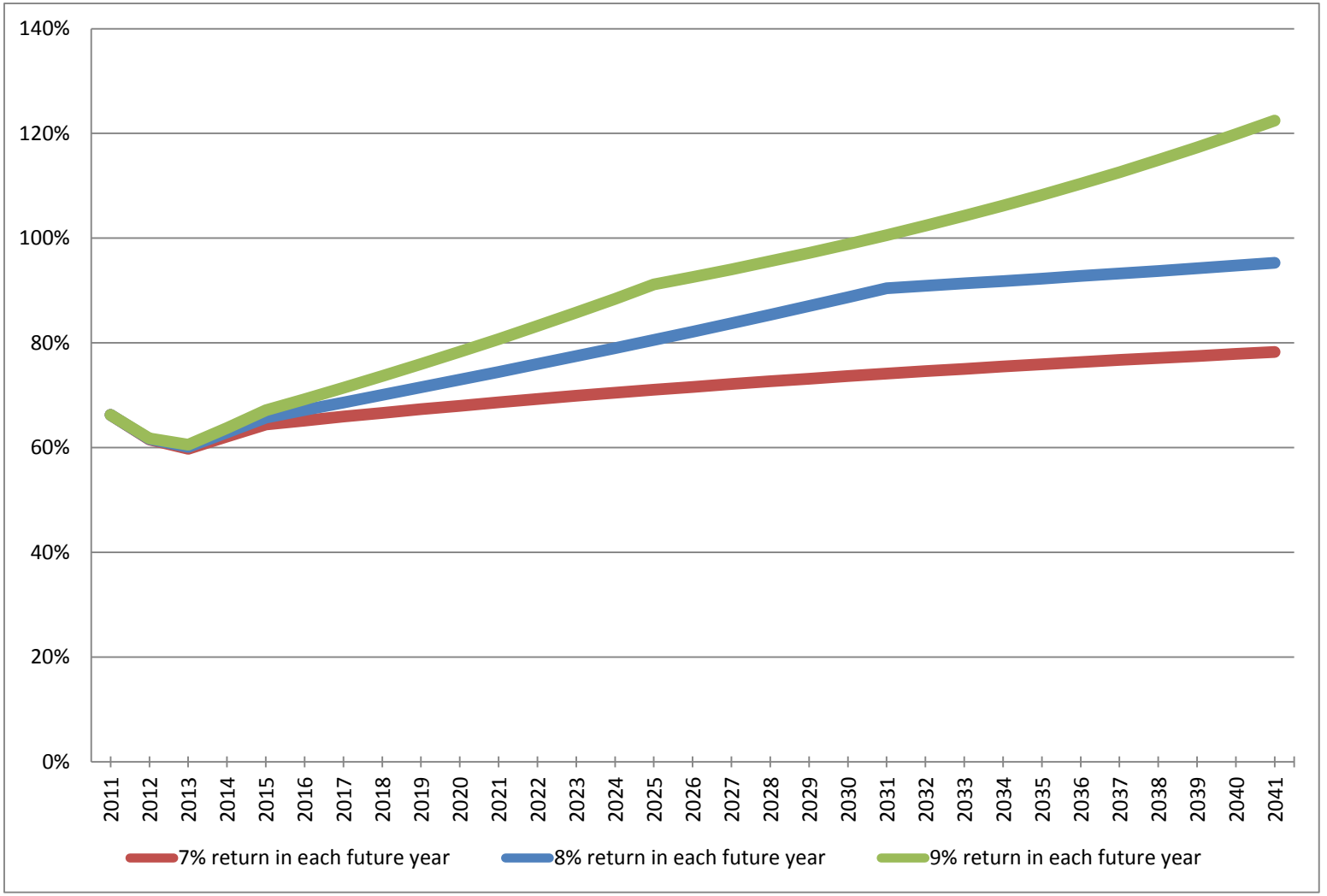
Projected Funded Ratios (MVA Basis)

Valuation Year	24% for FY2012	16% for FY2012	8% for FY2012	0% for FY2012	-8% for FY2012	-16% for FY2012	-24% for FY2012
2011	63%	63%	63%	63%	63%	63%	63%
2012	72%	68%	63%	58%	53%	49%	44%
2013	73%	68%	64%	59%	54%	49%	44%
2014	74%	69%	64%	59%	54%	49%	44%
2015	76%	71%	66%	61%	55%	50%	45%
2016	78%	73%	67%	62%	57%	51%	46%
2021	87%	81%	74%	68%	62%	56%	49%
2026	93%	90%	82%	75%	67%	60%	52%
2031	95%	94%	90%	82%	73%	64%	55%
2036	99%	96%	93%	89%	79%	68%	58%
2041	102%	100%	95%	93%	85%	73%	60%

Projected Margin (AVA Basis)

Valuation Year	24% for FY2012	16% for FY2012	8% for FY2012	0% for FY2012	-8% for FY2012	-16% for FY2012	-24% for FY2012
2011	-4.41%	-4.41%	-4.41%	-4.41%	-4.41%	-4.41%	-4.41%
2012	-1.41%	-1.72%	-2.04%	-2.35%	-2.67%	-2.98%	-3.29%
2013	-1.27%	-2.00%	-2.73%	-3.46%	-4.19%	-4.91%	-5.64%
2014	4.36%	3.23%	2.10%	0.97%	-0.16%	-1.28%	-2.41%
2015	5.93%	4.41%	2.90%	1.39%	-0.12%	-1.63%	-3.14%
2016	7.00%	5.13%	3.25%	1.37%	-0.51%	-2.38%	-4.26%
2021	9.92%	7.57%	5.22%	2.87%	0.52%	-1.83%	-4.18%
2026	2.67%	10.64%	7.69%	4.75%	1.80%	-1.14%	-4.08%
2031	3.74%	2.92%	1.63%	7.10%	3.41%	-0.27%	-3.96%
2036	5.08%	4.05%	2.44%	10.04%	5.43%	0.81%	-3.81%
2041	6.76%	5.47%	3.45%	2.18%	7.95%	2.17%	-3.61%

Projected Funded Ratios (AVA Basis)
Actual Returns +1% or -1% of Assumed



Questions?

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